

CLAIMS

What is claimed is:

- 002020-68896460
1. An ion thruster comprising a hollow cathode assembly, the hollow cathode assembly comprising:  
a heater including  
an inner ceramic sleeve having an outer surface,  
5 an outer ceramic sleeve having an inner surface, the outer ceramic sleeve overlying the inner ceramic sleeve with a filament volume between the outer surface of the inner ceramic sleeve and the inner surface of the outer ceramic sleeve,  
10 a wound filament having windings disposed within the filament volume, and  
a mass of ceramic powder filling a remaining portion of the filament volume between the windings of the filament; and  
a cathode disposed within the inner ceramic sleeve of the heater.
  - ✓ 2. The ion thruster of claim 1, wherein the inner ceramic sleeve and the outer ceramic sleeve are made of a ceramic selected from the group consisting of aluminum oxide and magnesium oxide.
  3. The ion thruster of claim 1, wherein the ceramic powder is selected from the group consisting of aluminum oxide powder and magnesium oxide powder.
  4. The ion thruster of claim 1, wherein the filament is made of a material comprising tungsten-3 weight percent rhenium.
  5. The ion thruster of claim 1, wherein the filament is in the form of a flat ribbon.

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6. The ion thruster of claim 1, wherein the cathode is made of a material comprising porous tungsten impregnated with barium carbonate, calcium carbonate, and aluminum oxide.

7. The ion thruster of claim 1, wherein the hollow cathode assembly comprises a portion of a charge neutralizer.

8. The ion thruster of claim 1, wherein the hollow cathode assembly comprises a portion of a plasma source.

9. The ion thruster of claim 1, further including a heat shield overlying the outer ceramic sleeve.

Sub. A1

5 (10.) A method <sup>of</sup> for making an ion thruster having a hollow cathode assembly, the method including the preparation of the hollow cathode assembly by the steps of:

10 preparing a filament;

forming the filament into a cylindrical shape;

providing an inner ceramic sleeve, an outer ceramic sleeve, and a mass of ceramic powder;

positioning the filament and the mass of ceramic powder between the inner ceramic sleeve and the outer ceramic sleeve;

providing a cathode; and

positioning the cathode within the interior of the inner ceramic sleeve.

attaching said cathode assembly to said ion thruster

11. The method of claim 10, wherein the step of preparing the filament includes the step of forming a metallic piece into a wound shape.

12. The method of claim 10, wherein the step of forming the filament includes the step of forming the filament into a right circular cylindrical shape.

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13. The method of claim 10, wherein the step of providing an inner ceramic sleeve, an outer ceramic sleeve, and a mass of ceramic powder includes the step of

5 providing an inner ceramic sleeve comprising a ceramic selected from the group consisting of aluminum oxide and magnesium oxide, an outer ceramic sleeve comprising a ceramic selected from the group consisting of aluminum oxide and magnesium oxide, and ceramic powder comprising a ceramic selected from the group consisting of aluminum oxide powder and magnesium oxide powder.

14. The method of claim 10, wherein the step of providing a cathode includes the step of

providing porous tungsten impregnated with barium carbonate, calcium carbonate, and aluminum oxide.

15. The method of claim 10, including an additional step of positioning a heat shield over the outer ceramic sleeve.

16. The method of claim 10, including an additional step of assembling the hollow cathode assembly into a plasma source.

17. The method of claim 10, including an additional step of assembling the hollow cathode assembly into a charge neutralizer.

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